

**Title:** Improved Knee Joint

**Abstract:** The present utility model relates to an improved knee joint, characterized in that a rotating portion is socketed into a knee joint main body by using an axis so that the rotating portion rotates about the axis. A unidirectional bearing is placed into a rotating device of the rotating portion so that the rotating portion can restore to its original position quickly by using a restoring force of a cushioning device and the unidirectional bearing of the rotating portion when it restores anticlockwise; and the rotating portion can bend slowly by using the cushioning device and a relatively large friction when it bends clockwise. By this to and fro motion, the disabled can use the prosthesis effectively to improve their mobility.

## **Claims**

1. An improved knee joint, characterized in that a rotating portion, which rotates about an axis of a knee joint main body, is socketed on the axis; the rotating portion mainly comprises a rotating device where a unidirectional bearing is provided and which has its rear end connected to an upper end of a cushioning device; and the rotating portion of the knee joint presents a quick anticlockwise rotation and a slow clockwise rotation.
2. The improved knee joint according to claim 1, characterized in that an elastic rubber is mounted above the knee joint main body.

## **Description**

### **Improved Knee Joint**

The present utility model relates to a prosthetic knee joint device, especially relates to a prosthesis for the disabled, i.e. an improved knee joint for a relatively convenient and safe use.

Nowadays, the disabled can improve their mobility by use of a prosthetic structure. A knee joint structure like a knee is worked out so that the prosthesis can bend and walk like a foot. The prosthesis is made to bend and walk more like a human foot so that the disabled can walk more conveniently by use of this prosthesis. However, although the prosthetic knee joint structure has the same function as a foot, it only can effectively move with the help of motions like raising a leg and swinging of the disabled since a prosthesis is always a mechanical structure. With regard to the existing knee joint structure, such as Taiwan Patent Publication No. 203742 “Improved Construction of Knee Joint”, its packing device uses a rotating shaft so that the packing device rotates about a shaft lever. A prosthesis, which is not a part of the body after all, cannot be controlled flexibly. Therefore, a too quick rotation at the time of bending usually causes the following problems of inconvenient and unsafe uses: a force cannot be exerted to compress a packing sleeve when an angle is too big so that the prosthesis quickly bends to a right angle and thus the disabled fall wound due to no support, the prosthesis cannot restore to its original position very quickly after the bending so that the disabled only can walk with short steps, etc.

It is an object of the present utility model to provide an improved knee joint, i.e. to provide a knee joint structure presenting a slow clockwise bending and a quick anticlockwise restoring.

The object of the present utility model is achieved as follows:

An improved knee joint, characterized in that a rotating portion, which rotates about an axis of a knee joint main body, is socketed on the axis; the rotating portion mainly comprises a rotating device where a unidirectional bearing is provided and which has its rear end connected to an upper end of a cushioning device; and the rotating portion of the knee joint presents a quick anticlockwise rotation and a slow clockwise rotation.

An elastic rubber is mounted above the knee joint main body.

The present utility model mainly places a unidirectional bearing into a rotating device so that the rotating portion can restore to its original position quickly by using a restoring force of a cushioning device and the unidirectional bearing of the rotating portion when it restores anticlockwise; and the rotating portion can bend slowly by using the cushioning device and a relatively large friction when it bends clockwise. By this to and fro motion, the disabled can use the prosthesis effectively to improve their mobility.

Since the present utility model has a flexible structure, it makes the mobility of the disabled more convenient and safe when it is applied to their prostheses.

The technical solution and embodiment of the present utility model shall be further described based on the following drawings, in which:

Description of Figures:

FIG. 1 is a stereostructural diagram of a knee joint of the present utility model;

FIG. 2 is a sectional view at an axis of the present utility model;

FIG. 3 is a combined sectional view of the knee joint of the present utility model;

FIG. 4 is a combined sectional view of a bent knee joint of the present utility model;

FIG. 5 is a sectional view of a pressure key upon which a force is exerted of the present utility model;

FIG. 6 is a stereogram of a rotating device of the present utility model.

As shown in FIGS. 1 and 2, the present utility model is characterized in that a rotating portion 2000 is socketed into a knee joint main body 1000 by using an axis 3000 so that the rotating portion 2000 rotates about the axis 3000; a pivoted sleeve 1100 is

provided below the knee joint main body 1000 to fix a supporting rod 6000; the lower part of the supporting rod 6000 can be pivoted to structures such as an upper ankle and a sole; a perforation 1010 is provided above the pivoted sleeve 1100; a cushioning device 5000 can be coupled with the lower part of the knee joint main body 1000 by using a bolt 5200 so that the cushioning device 5000 rotates about the bolt 5200; a perforation 5010 at an upper end of the cushioning device 5000 can be connected to a bolt 5300 at a rear end of a rotating device 2100 through a perforation 2110 to achieve that the rotating portion 2000 can bend slowly by using the cushioning device 5000 when it bends clockwise to avoid imbalance caused by a quick bending and thus to avoid danger occurred to the disabled; an elastic rubber 5100, which is also mounted above the knee joint main body 1000, can absorb an impact force produced when the rotating portion 2000 turns back.

A pivoted portion 6100 is installed on thighs of the disabled; an upper cover 4000, coupled with the pivoted portion 6100, shall be coupled with a perforation 2130 of the rotating device 2100 by using a bolt 5400 so that the rotating device 2100 bends about the axis 3000 when the disabled move.

The rotating portion 2000 is formed by installing a sleeve 2200 having a clearance 2220 and a unidirectional bearing 2300 into the rotating device 2100. An inner surface of the sleeve 2200 is a frictional surface 2210, and an outer surface of the unidirectional bearing 2300 is a rotating surface 2310. An aperture 2120 is provided on the upper part of the rotating device 2100, and a pressure key 2600 is provided into the aperture 2120. Baffles 2400 and 2500 are mounted on the two sides of the rotating device 2100, respectively. The axis 3000 and the rotating portion 2000 are locked to the knee joint main body 1000 by using a screw 3100 so that the rotating portion 2000 rotates about the axis 3000. Bearings 2410 and 2510 are provided into the baffles 2400 and 2500, respectively so that the rotating portion 2000 can rotate about the axis 3000 more smoothly. In addition, a bearing 5020 is provided in the perforation 5010 in a place of attachment for the upper part of the cushioning device 5000 and the

rotating device 2100 so that the rotation can be more smooth.

As shown in FIGS. 3 and 4, when the upper cover 4000 rotates about the axis 3000 until the cushioning device 5000 cannot cushion any more, the cushioning device 5000 also can slow down the speed during the bending. A screw 4100 is provided into the upper cover 4000 so that the position of a pressure rod 4200 can be adjusted by using the screw 4100 and thus a force exerted can be adjusted by use of the positional change.

As shown in FIGS. 5 and 6, the unidirectional bearing 2300 only allows an anticlockwise rotation. Therefore, the unidirectional bearing 2300 can function to rotate quickly only when the rotating portion 2000 rotates anticlockwise. Since the unidirectional bearing 2300 cannot be put into service when the rotating portion 2000 rotates clockwise, the rotation will drive the unidirectional bearing 2300 and change into the rotation of the rotating surface 2310 of the unidirectional bearing 2300. In addition, the rotation of the rotating surface 2310 in the frictional surface 2210 of the sleeve 2200 will enlarge a friction area to achieve a motion mode of a quick anticlockwise rotation and a slow clockwise rotation for a convenient use by the disabled. An aperture 2120 is provided on the upper part of the rotating device 2100, and a pressure key 2600 is provided into the aperture 2120. When a force is exerted upon the pressure key 2600, the sleeve 2200 will be compressed to narrow the clearance 2220 and thus to enlarge the friction of the rotating surface 2310 and the frictional surface 2210, which is just like a brake function to make the rotating device 2100 not rotatable. Therefore, only by a relatively small pressure, the rotating device 2100 can stop rotation. Apart from angles at which a force cannot be exerted upon the pressure key 2600, the rotating device 2100 also can stop rotation at angles above 30° so that the disabled can be safer.

In summary of the above, the improved knee joint disclosed is not only safe but also more convenient in use. When it is put into service, its improved efficiency has met

the patent requirements for advancement and practical applicability. However, since the above disclosure is only a preferred embodiment of the present utility model, it cannot be used to limit the scope of carrying out the present utility model. Any equal change or modification in accordance with the scope of the present patent application for utility model still should be within the scope of the present utility model.

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## [12] 实用新型专利说明书

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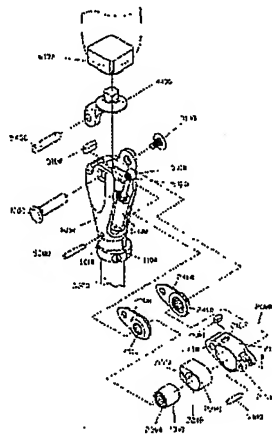
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[54]实用新型名称 改进的膝关节

[57]摘要

本实用新型是关于一种改进的膝关节,其特征主要是利用轴心将旋转部套接于膝关节主体内,让旋转部以轴心为中心旋转,其旋转部的旋转装置内置入单向轴承,让旋转部以逆时针回复时,利用缓冲装置的回复力和旋转部的单向轴承,而能快速的回复原位,当旋转部以顺时针弯曲时,利用缓冲装置和较大的摩擦力,而能缓慢的弯曲,藉由此往返的动作,让残疾人士能有效的运用假肢,使行动更为方便。



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## 权 利 要 求 书

1、一种改进的膝关节，其特征在于：该膝关节主体的轴心上套接一以该轴心为旋转中心的旋转部；该旋转部主要包括有一旋转装置，该旋转装置内设置一单向轴承，该旋转装置的后端与一缓冲装置上端相连；该膝关节的旋转部呈逆时针旋转快速和顺时针旋转缓慢状。

2、如权利要求 1 所述的改进的膝关节，其特征在于：该膝关节主体上方安装一弹性橡胶。



## 说明书

## 改进的膝关节

- 5 本实用新型涉及一种假肢膝关节装置，特别涉及一种让残疾人士使用的假肢，能更方便和安全使用的改进的膝关节。

现今社会上的残疾人士，可藉由假肢结构增加其行动性，而为使假肢能像脚一样的弯曲行走，遂研究出如同脚膝盖一样的膝关节结构，让假肢更像人脚一样的弯曲行走，藉由此假肢让残疾人士更方便行走；然而假肢  
10 膝关节结构虽具有和脚相同的功能，可是由于假肢始终是一种机械结构，需残疾人士运用抬腿和摆动等动作，才能有效的运动，可是现今的膝关节结构，如台湾专利公告第 203742 号“膝关节的改良构造”，其迫紧装置利用转轴，让迫紧装置以轴杆为中心旋转，由于假肢终究不是自己身体的一部份，无法控制的相当灵活，所以常常会因要弯曲时旋转过快，导致如角  
15 度过大时无法施力压紧迫紧套，造成假肢快速弯曲成直角，让残疾人士无支撑而跌倒受伤，且当弯曲后无法非常快速的回复原位，让残疾人士只能小步行走等使用上不方便和不安全的诸多问题。

本实用新型的目的是要提供一种改进的膝关节，即是提供一种于顺时针弯曲缓慢，逆时针回复快速的膝关节结构。

- 20 本实用新型的目的是这样实现的：

一种改进的膝关节，其特征在于：该膝关节主体的轴心上套接一以该轴心为旋转中心的旋转部；该旋转部主要包括有一旋转装置，该旋转装置内设置一单向轴承，该旋转装置的后端与一缓冲装置上端相连；该膝关节的旋转部呈逆时针旋转快速和顺时针旋转缓慢状。

- 25 该膝关节主体上方安装一弹性橡胶。

本实用新型主要是将旋转装置内置入单向轴承，让旋转部以逆时针回复时其利用缓冲装置的回复力和旋转部的单向轴承，而能快速的回复原位，当旋转部以顺时针弯曲时利用缓冲装置和较大的磨擦力而能缓慢的弯曲，



藉由此往返的动作，让残疾人士能有效的运用假肢，使行动更为方便。

本实用新型结构灵活、运用于残疾人士的假肢上，其行动更为方便、安全。

以下结合附图进一步说明本实用新型的技术方案和实施例。

5 附图说明：

图 1 是本实用新型膝关节的立体结构示意图；

图 2 是本实用新型轴心处的剖视图；

图 3 是本实用新型膝关节的组合剖视图；

图 4 是本实用新型膝关节弯曲的组合剖视图；

10 图 5 是本实用新型压键施力的剖视图；

图 6 是本实用新型旋转装置的立体图。

请参阅图 1、2，本实用新型是利用轴心 3000 将旋转部 2000 套接于膝  
关节主体 1000 内，让旋转部 2000 以轴心 3000 为中心旋转，于膝关节主体  
1000 下方设有一枢接套筒 1100，要将支杆 6000 固定，其支杆 6000 下方可  
15 枢接上脚踝和脚掌等结构；于枢接套筒 1100 上方设有一穿孔 1010，利用  
插销 5200 可将缓冲装置 5000 结合在膝关节主体 1000 下方，使缓冲装置 5000  
以插销 5200 为中心旋转使用，其缓冲装置 5000 上端的穿孔 5010，可与旋  
转装置 2100 后端的插销 5300 通过穿孔 2110 连接，达到当旋转部 2000 以  
顺时针旋转时，利用缓冲装置 5000 可缓慢的弯曲，不易快速弯曲而产生不  
20 平衡，使残疾人士发生危险；其膝关节主体 1000 上方亦安装一弹性橡胶  
5100，可吸收旋转部 2000 转回时的冲击力量。

于残疾人士的大腿上加装一枢接部 6100，将上盖 4000 和枢接部 6100  
结合，其上盖 4000 利用插销 5400 要与旋转装置 2100 的穿孔 2130 结合，  
使移动时以轴心 3000 为中心弯曲使用。

25 其旋转部 2000 是将旋转装置 2100 内加装有一间隙 2220 的一套筒 2200  
和一单向轴承 2300，该套筒 2200 内表面为一磨擦面 2210，该单向轴承 2300  
外面为一旋转面 2310，该旋转装置 2100 上方设有一孔口 2120，该孔口 2120  
内设一压键 2600，于旋转装置 2100 两旁各安装一挡板 2400、2500，将轴

心 3000 和旋转部 2000 利用螺丝 3100 锁固于膝关节主体 1000 上，以轴心 3000 为旋转中心旋转运用，其档板 2400、2500 内分别设有轴承 2410、2510，可使旋转部 2000 以轴心 3000 旋转更为顺畅，加上缓冲装置 5000 上方与旋转装置 2100 连结处的穿孔 5010 亦设有一轴承 5020，也可使旋转更为顺畅。

- 5        请参阅图 3、4 所示，本实用新型其上盖 4000 以轴心 3000 旋转至缓冲装置 5000 无法再缓冲时，其缓冲装置 5000 亦可减缓弯曲时的速度；于上盖 4000 内设有一螺丝 4100，利用螺丝 4100 可调整压杆 4200 的位置，藉由位置变动可调整施力的大小。

- 10        请参阅图 5、6 所示，本实用新型其单向轴承 2300 只允许逆时针旋转，所以当旋转部 2000 以逆时针旋转时该单向轴承 2300 才能发挥功能而能快速旋转，当旋转部 2000 以顺时针旋转时因单向轴承 2300 不能使用，所以旋转时将带动单向轴承 2300，变成以单向轴承 2300 的旋转面 2310 旋转，且因旋转面 2310 在套筒 2200 的磨擦面 2210 内旋转，将导致磨擦面积变大，达到逆时针旋转时快速，而顺时针旋转时缓慢的运动方式，使残疾人士更
- 15        方便使用；其旋转装置 2100 上方设有一孔口 2120，于孔口 2120 内设有一压键 2600，当压键 2600 受力后将压迫套筒 2200 使间隙 2220 变小，造成旋转面 2310 和磨擦面 2210 的磨擦力变大，就如同煞车功能而无法旋转，故只需较小的压力即可停止旋转，除了无法于压键 2600 上施力的角度外，超过 30 度还可停止旋转，可让残疾人士更为安全。

- 20        综上所述，其所揭露的改进的膝关节，不仅安全且更方便使用，运用时其增进的功效更已具先进性及实用性的专利要件；但以上所述，仅为本实用新型的一较佳实施范例，当不能以之作为限定本实用新型实施的范围，凡依本实用新型申请专利范围所作的均等变化或修饰，仍应属本实用新型专利涵盖的范围内。

# 说明书附图

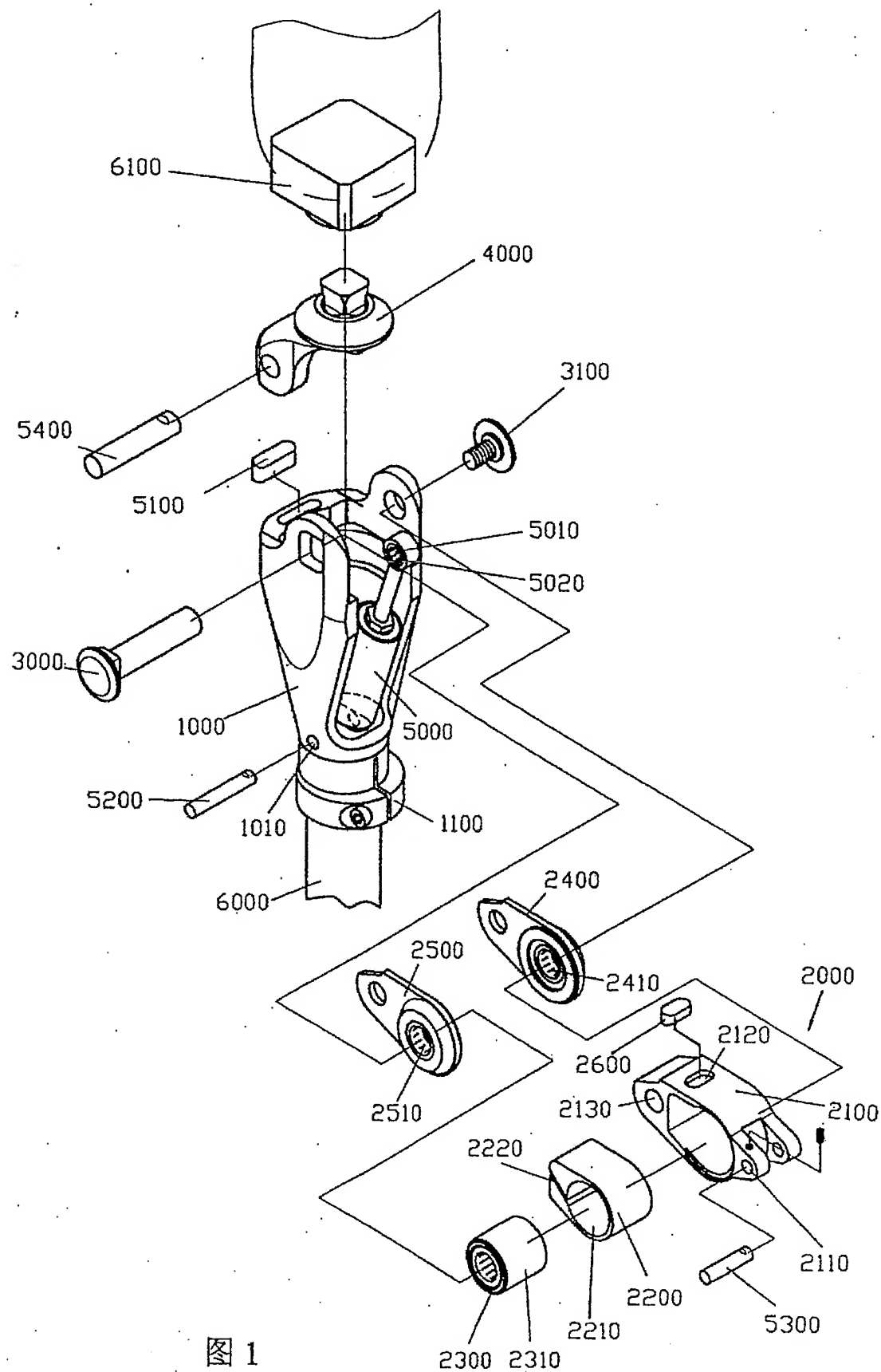


图 1

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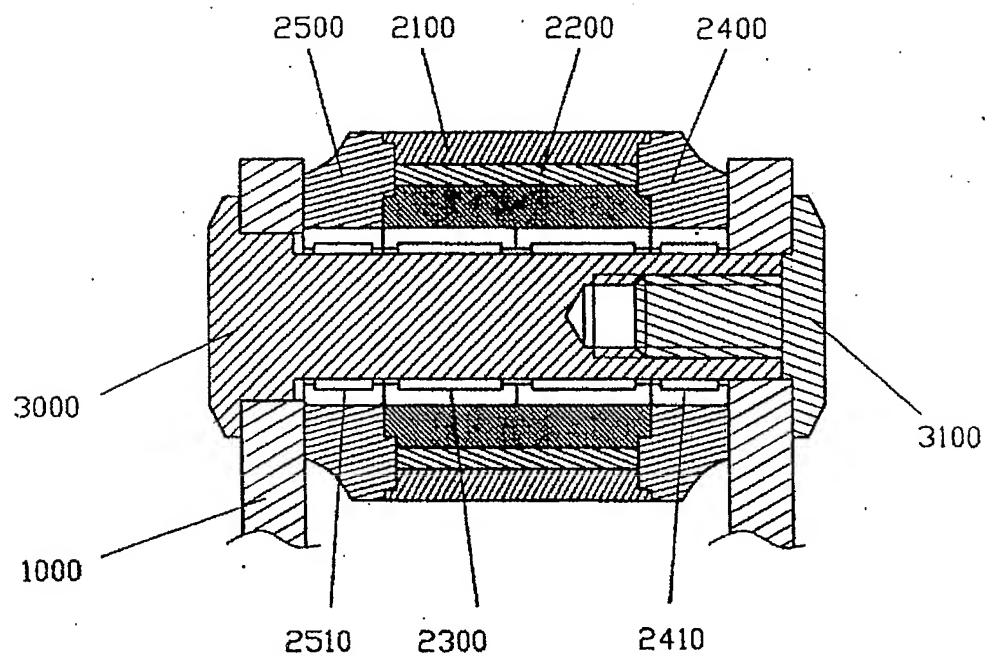


图 2

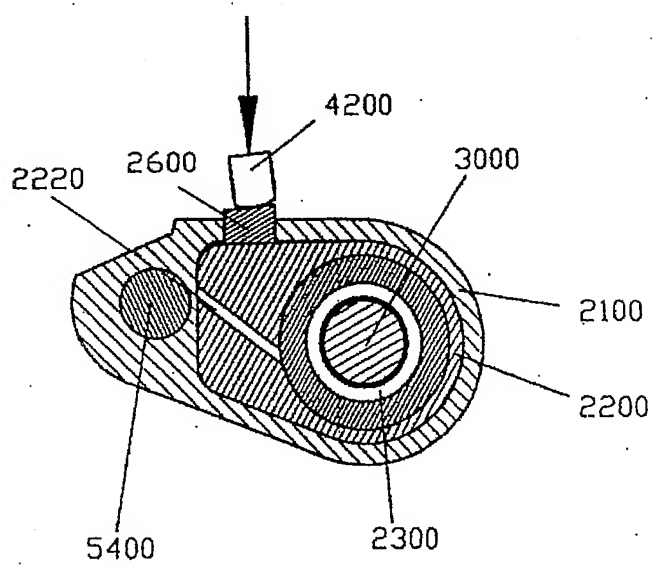


图 5

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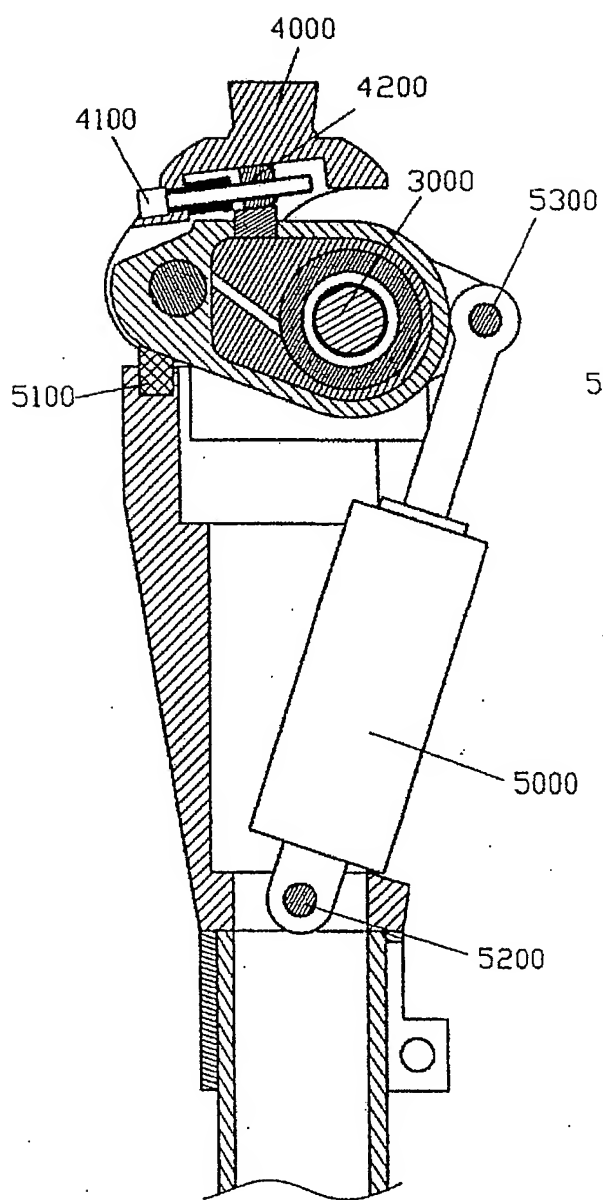


图 3

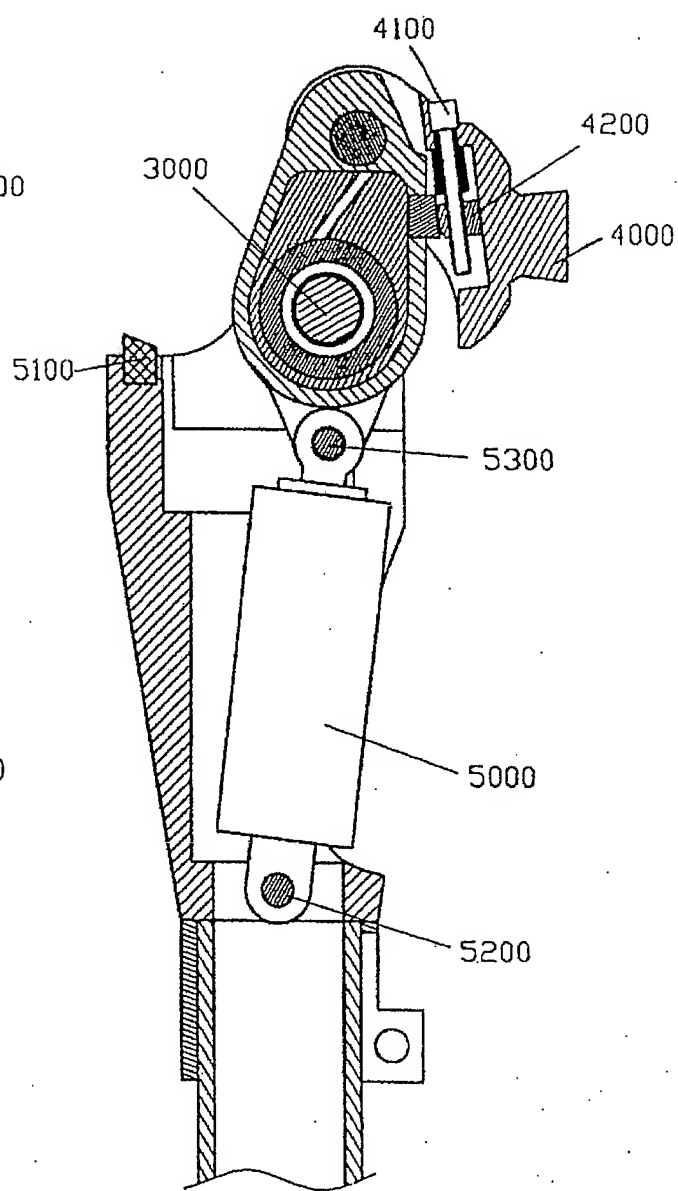


图 4

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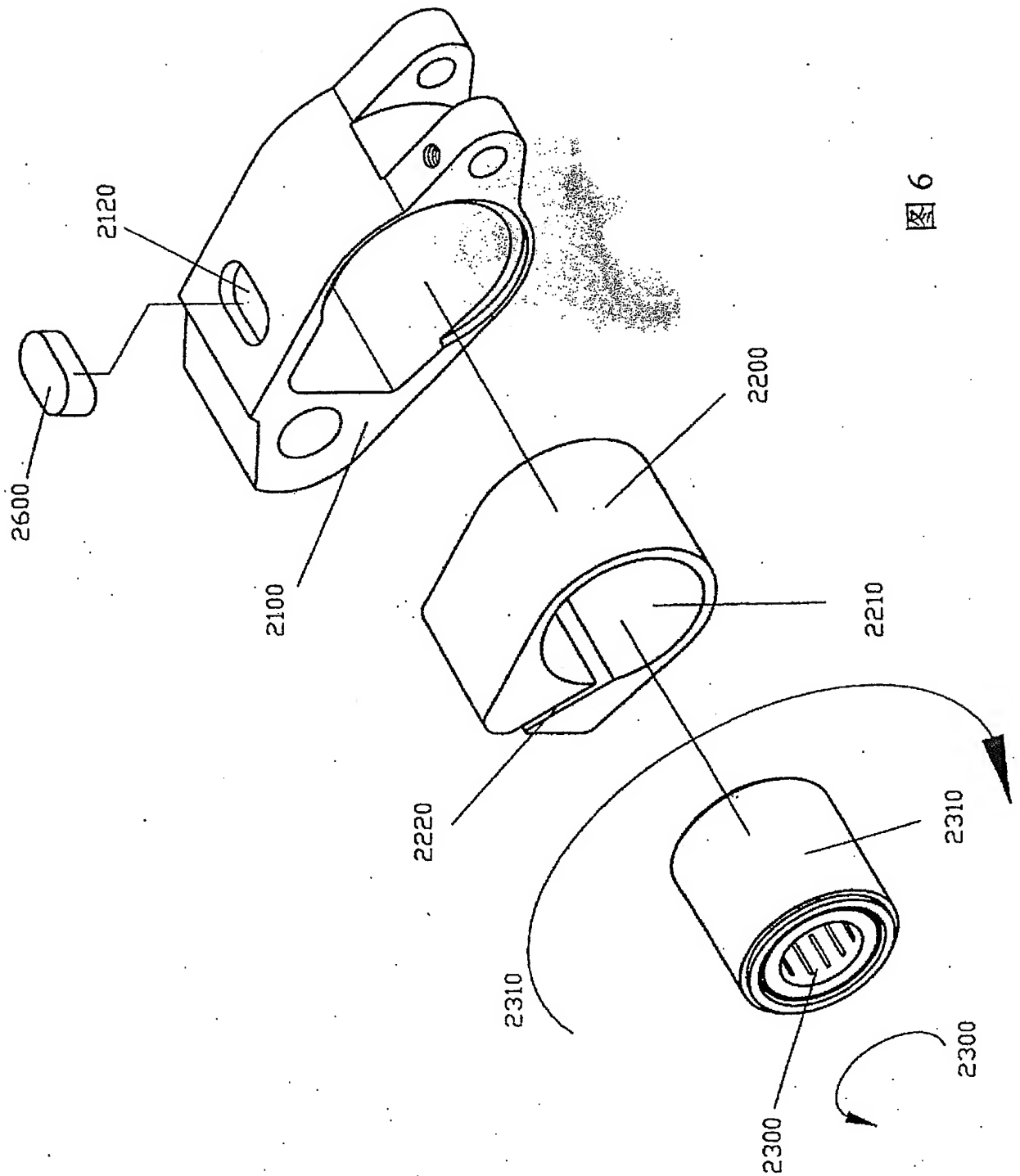


图 6